It is not uncommon to calculate the size of the terrestrial biosphere sink as the residual from other, better-known terms in the global carbon cycle. For example,

\[
\text{terrestrial biosphere} = \text{fossil fuel emissions} + \text{land use emissions} - \text{oceanic uptake} - \text{atmospheric reservoir increase}.
\]

This presentation examines the implications of the uncertainty in the annual fossil fuel flux on the magnitude of terrestrial biosphere flux. The focus here is on the terrestrial biosphere because current measurements, inventories, and models do not fully and independently account for the size of the terrestrial biosphere sink.

This exercise reduces the magnitude of global fossil fuel emissions by an amount equal to the two sigma error (95% confidence interval) associated with that magnitude. Keeping other fluxes in the above equation constant results in a reduction in the terrestrial biosphere flux. The significance of this exercise is that by considering the uncertainty in the fossil fuel flux term, the magnitude of the residual terrestrial uptake flux is reduced by an average of 27% (range -88 to 430%). Additionally, the years that the terrestrial uptake flux is negative (i.e., it is a source to rather than a sink from the atmosphere) increases from two to four years out of the 58 years examined.

The two sigma error used here is based upon a new examination of the fossil fuel data and a more rigorous analysis of the associated error term (Andres et al., in prep.). The average, annual, global error over the 1959 to 2007 time frame is approximately 9.5%.